REMARKS

Claims 5-6 and 12-15 are pending in this application. By this Amendment, the specification is amended for clarity. No new matter is added.

I. The Claims Are Patentable Over the Applied References

The Office Action (1) rejects claims 5-6 and 12-14 under 35 U.S.C. §103(a) over U.S. Patent No. 6,801,220 to Greier et al. (Greier) in view of U.S. Patent No. 5,886,682 to Biggs; and (2) rejects claim 15 under 35 U.S.C. §103(a) over Greier in view of Biggs, and further in view of U.S. Patent No. 7,009,579 to Kondo et al. (Kondo). Applicants respectfully traverse the rejections.

Regarding independent claim 5, the applied references fail to disclose (1) "each [single pixel] including sub pixels corresponding to a plurality of colors to resolution-converted image data including image data of first, second, third, and fourth pixels each having sub pixels corresponding to a plurality of colors, each of the single pixels corresponding to a pixel group that consists of the corresponding ones of the first, second, third, and fourth pixels that were converted from that single pixel", "the viewing angle range adjustment device setting grayscale values of different color sub pixels of the pixels within a same pixel group based on different viewing angle characteristics of the different color sub pixels"; and (2) "the viewing angle range adjustment device sets different grayscale values for the same color sub pixels of adjacent ones of the first, second, third, and fourth pixels" (comment and emphasis added).

Regarding independent claim 14, the applied references fail to disclose (3) "the resolution conversion device converting each image pixel of the original image data into first, second, third, and fourth image pixels of resolution-converted image data", "within each group of image pixels, adjusting grayscale values of each sub pixel of each group of image pixels according to the viewing angle characteristics of the color of the sub pixel"; and

(4) "wherein the viewing angle range adjustment device, within each group of image pixels, adjusts the grayscale values to be different for the same color sub pixels of the corresponding first, second, third, and fourth pixels" (emphasis added).

Greier discloses (i) adjusting sub pixel intensity values to improve viewing angle characteristics, and (ii) alternating voltage directions on a sub pixel basis to reduce flicker. Greier discloses adjusting sub pixel intensity values based on the dependency of sub pixel luminance on initial intensity values of the sub pixels in order to shift sub pixel intensity values from mid-tone levels, which provide non-ideal viewing angle and color characteristics, to either bright or dark intensity levels (col. 4, lines 62-66), which have improved viewing angle characteristics. This adjustment is done by pixel groups with average luminance preserved in local areas (col. 12, line 61 - col. 13, line 4). In order to prevent flicker, Greier discloses alternating the polarity of the applied voltages to the pixels, in various patterns (col. 13, lines 46-55). The Office Action acknowledges that Greier fails to disclose changing the sizes of images, but alleges that Biggs cures this deficiency.

Biggs discloses a method for enlarging a bitmap image by duplicating pixels in the bitmap (see Figs. 4a-4b; col. 3, lines 51-63), including converting pixels of an image into four pixels in the resolution-converted image (Figs. 1a-1b).

Regarding feature (1) quoted above, the Office Action cites to Greier, Fig. 19 as disclosing a viewing angle range adjustment device that sets grayscale values of different sub pixels within a same pixel group. However, the applied references fail to disclose feature (1) above because (1) even if Greier and Biggs are combined as proposed, there is no disclosure in Greier and Biggs that a pixel group, for which a viewing angle range adjustment device sets the grayscale values as taught by Greier, corresponds to the same four pixels derived from a single original pixel, as taught by Biggs. While Greier Fig. 19 shows a 2x2 sub pixel pattern, Greier does not disclose that this pattern must match up to four pixels that are derived

from a single original pixel because Greier, as acknowledged by the Office Action, does not teach changing image resolution. Biggs does not disclose any changing of grayscale values.

The Office Action, in the Response to Arguments section, suggests that Applicants are attacking the Greier reference individually when asserting that the pixel groups of Biggs are not shown by the applied references to be the same as the pixel groups of Greier. Contrary to the Office Action's assertion, Applicants are traversing the proposed combination as a whole. Biggs discloses changing image resolution such that one pixel becomes four pixels in the resolution-converted image. Greier discloses modifying grayscale values for pixel groups. However, both Greier and Biggs taken as a whole do not contain any disclosure that the pixel groups of Biggs that result from a same original pixel would be the same pixel group used by Greier to adjust grayscale values. Absent any reason one of ordinary skill in the art would have used the pixel groups of Biggs to be the same pixel groups of Greier, the proposed combination is improper. The Office Action has asserted no such reason that is non-conclusory (that is based on facts).

Presumably in Biggs, once an image is scaled, whether two pixels originated from the same original pixel is immaterial. That is, the method of Biggs is designed to scale images to have a similar visual appearance to the original image, although having greater resolution. There is no teaching in Greier that would suggest using only pixels originating from a same original pixel as the basis for scaling the grayscale values. Thus, the assertion by the Examiner that the four pixels derived from a single original pixel as taught by Biggs would be the same pixel group of Greier used to adjust the grayscale values is based on impermissible hindsight, using Applicants' disclosure as a road map.

The applied references fail to disclose feature (2) quoted above because, while the Office Action cites to Fig. 19 as disclosing this feature, the figure does not support this allegation. Fig. 19 shows a 2x2 sub pixel pattern. In Fig. 19, a dark pixel (one whose

intensity is lowered) is shown by crosshatching and a bright pixel (one whose intensity is increased) is shown without crosshatching. The "+" sign indicates positive voltage polarity, and the "-" sign indicates negative voltage polarity. Thus, at best, Greier indicates that for the same color sub pixels in a 2x2 pattern (e.g., the four green color sub pixels) two of the sub pixels are modified to be bright, and two are modified to be dark. As different amounts of intensity change are not indicated, one of ordinary skill would have understood that Greier's process is implemented by adding the same value to, or subtracting the same value from, the intensities of the same color sub pixels. Biggs, cited for disclosing modification of image resolution, fails to cure the deficiencies of Greier. Thus, the claimed feature is not disclosed by the applied references.

The Office Action asserts that feature (3) quoted above is disclosed by Greier, citing to Greier, col. 13, lines 11-32, and col. 4, lines 11-21. However, at col. 13, lines 11-32, Greier discloses the constraints on column and row inversion (voltage polarity) and does not disclose that the grayscale values of each sub pixel of each group of image pixels are set according to the viewing angle characteristics of the color of the sub pixel. Further, at col. 4, lines 11-21, Greier notes that the intensities of sub pixels are modified, taking into consideration the luminance characteristics of the sub pixels. While it may be reasonable for the Patent Office to consider the luminance value as a viewing angle characteristic, Greier does not disclose that the grayscale value of each sub pixel is modified on the basis of the same color viewing angle characteristic. Biggs fails to cure the deficiencies of Greier.

The applied references fail to disclose feature (4) quoted above of claim 14 for the same reasons discussed in relation to feature (2) quoted above in relation to claim 5.

For the foregoing reasons, Applicants request withdrawal of the rejections.

II. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

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Attachment:
Request for Continued Examination

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